

Abstract Submitted  
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**Formation of snow penitentes by radiative instabilities** WILKO

ROHLFS, RWTH - Aachen — Penitents are large scale snow or ice structures covering snow and glacier fields in the tropics or subtropics at high altitudes as for instance in the Andes. The characteristic structure of penitentes is their blade-like shape with a size ranging from a few centimeters up to 30m, with their walls preferentially orientated from east to west. Although the distribution of penitents on a snow or ice field appears chaotic, they exhibit a characteristic pattern with a distinct separation distance, for which their formation can be associated to some kind of instability. The instability results from the process of radiative trapping, which is caused by higher absorbed solar radiation in local cavities and troughs. As a consequence, a variation in the ablation forms the penitentes. A simple two-dimensional numerical model is developed to investigate the ablation process of penitentes. Special focus is given to the wavelength of the arising instability and its selection mechanism. The results of the numerical simulation indicate that the wavelength increases during ablation season and is directly tied to the inclination angle between snow surface and sun.

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